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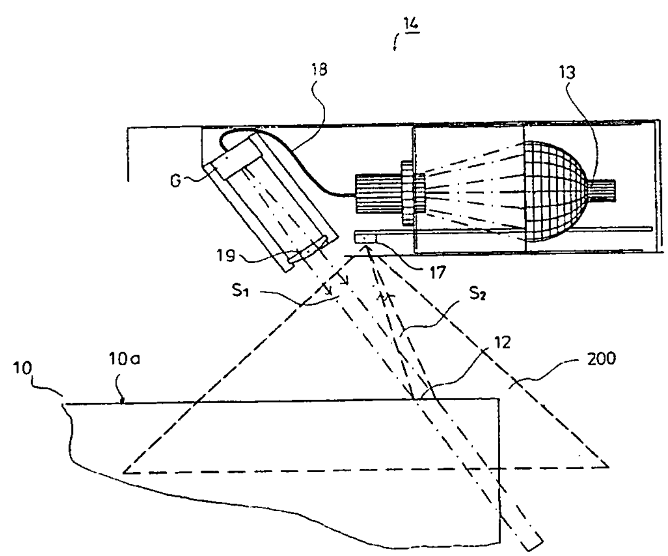

(57) Abstract

The invention concerns an identifier and a method in identification of an object. The identifier comprises a source of light (13), from which a strip of light of uniform thickness is produced onto the face of the object to be identified. Said strip of light or beam of light (12) produced onto the face of the object is monitored by means of a colour differentiation device (17), which receives the ray of light reflected from the face of the object. By means of signals produced by means of the colour differentiation device (17), colour codes are produced out of different face areas of the monitored object, which codes are compared with color codes of objects to be identified stored in the memory of the central unit of the device, in which connection of the object is identified on the basis of the comparison.

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Identifier and a method in identification of an object

The invention concerns an identifier and a method in identification of an object.

As is well known, bottles of beverages, beer and equivalent are transported and stored in crates. The crates are, as a rule, property of a certain brewery or equivalent, and they are used on the return basis.

In certain situations, it is necessary to identify and to sort crates belonging to different owners. In other respects the crates can be of similar construction and shape, but they differ from each other in respect of a logo fitted on the side face. Earlier, it has been necessary to identify and to sort such crates manually, which has been time-consuming and, thus, caused a great deal of costs.

In the most general embodiment of the present invention, the subject of the invention is expressly identification of objects. Herein objects in general are understood as products, packages, cans, etc. A particular field of application of the present invention is identification of returnable crates for bottles and in particular of crates that contain returnable bottles in connection with an automatic return-crate machine.

It is a further object of the invention to provide an equipment and a method that is as reliable as possible and does not require a precise position of the crate, i.e. a precise distance of the crate from the side of the conveyor. A further object of the invention is to provide an equipment and a method in which it is possible to classify the crates on the basis of minor details also when their main logo is identical but their side face includes some differences of symbols or patterns on whose basis they can be differentiated.

In the present patent application, an equipment of identification is described which is suitable for differentiation of all objects, products, packages, etc. on the basis of colour. The invention is particularly well suitable for identification of crates, such as crates for bottles. The invention is, in particular, suitable for use in connection with automatic return-crate machines, in which case the return machine identifies, besides the crate, also the returned bottles contained in the crate and produces a return receipt and/or a return money and/or a pawn or any other certificate concerning the return, i.e. the crates and the bottles. The equipment in accordance with the invention is placed so that it is protected from light, in which case interfering light from outside does not constitute an obstacle for identification of the crate.

In accordance with the invention, the crate is placed onto a conveyor and transferred at an invariable speed past the identifier. The identifier transmits a strip of light onto the face of the crate, and the beam of light that is reflected at said strip of light back into the device is examined on the basis of the proportions of three colours, red, green and blue. From each particular point of length along the side wall of the crate, at distances of about two millimetres, samples are taken of the face of the crate, in which connection the average colour of the crate is obtained at said point of length. The equipment does not have to identify the colours separately in the vertical direction. Samples are taken about 100 times in a second.

In the solution of equipment in accordance with the invention, a beam of light is produced on the face of the crate, and said beam extends over a substantial portion of the height of the side face of the crate. During identification of the colour of the crate, the conveyor moves at an invariable speed so that the beam of light scans over a substantial portion of the side face of the crate.

In the method in accordance with the invention, after the above reading, comparison is carried out with the data on pre-programmed crates stored in the memory of the device. By means of the computing algorithm, testing is carried out preferably based on the basic colour of the crate, a logo on the crate, and favourably also based on some particular point on the side face of the crate. In the method and the solution of

equipment in accordance with the invention, one side face of the crate is examined. The beam of light runs vertically and is placed perpendicularly to the plane of the top run of the conveyor, preferably a belt conveyor. The identification of the colour of the side of the crate is preferably started right from the forward edge of the crate and stopped about 100 mm before the other vertical edge of the crate.

In view of achieving the objectives stated above and those that will come out later, the identifier of objects and the method in identification of objects in accordance with the invention are characterized in what is stated in the patent claims.

By means of a device in accordance with the invention, in particular crates can be identified and differentiated reliably on the basis of colour, in which connection considerable economies of cost and time are achieved.

The device in accordance with the invention also permits automatic sorting of crates in different applications.

In the following, the invention will be described in more detail with reference to the figures in the accompanying drawing, the invention being, however, not supposed to be strictly confined to the details of said illustrations.

Figure 1A is a side view of a solution of equipment in accordance with the invention.

Figure 1B shows the solution of equipment viewed in the direction of the arrow k_1 in Fig. 1A.

Figure 1C shows the device viewed in the direction of the arrow k_2 in Fig. 1A.

Figure 1D shows the device viewed in the direction of the arrow k_3 in Fig. 1A.

Figure 2 is a schematic illustration of the main component of the device in accordance with the invention.

Figures 3A, 3B and 3C illustrate the device in accordance with the invention in operation from stage to stage.

Figure 4A illustrates the stripe of light, i.e. the beam of light, which is a vertical illuminated area, preferably shaped as a parallelogram, on the side face of the crate in the stage of Fig. 3A, Figure 4B shows the beam of light in the stage of Fig. 3B, and Figure 4C shows the beam of light in the stage of Fig. 3C.

Figure 5 illustrates a colour-identified side face of a crate as voltage curves.

Figure 6A illustrates the reading of the colour matrix of the crate and the preceding measurement of the distance of the crate.

Figure 6B illustrates the identification unit of the colour identification device, which unit is an integrated separate component comprising colour filters and detectors.

Figure 6C illustrates the colour matrix on the side face of a crate.

Figure 6D shows conversion graphs for normalization of the colour codes.

Figure 7 shows the equipment in connection with an automatic return-crate machine.

Fig. 1A is a side view of a solution of equipment in accordance with the invention. The invention is suitable for identification of objects in general. The invention is, however, in particular suitable for identification of crates. The crate 10 is placed onto the conveyor 11 and transferred on the top run of the conveyor 11, preferably a belt conveyor, further into the reading area 200 of the colour differentiation unit 14 (transfer direction arrow = N_1). The reading area 200 consists of the pyramid-shaped space defined by dashed lines in the figure, in which area the device 14 can

read the beam of light 12 produced onto the face of the crate 10. It is essential that the beam of light 12 is produced on the side face 10a of the crate 10 in the space defined by the pyramid 200. Inside the space defined by the pyramid 200, in any location on the border of the space or in its interior, the colour differentiation unit 14 is capable of reading the beam of light 12 produced from the source of light 13 on the side 10a of the crate 10.

Fig. 1B shows the solution of equipment viewed in the direction of the arrow k_1 in Fig. 1A, i.e. viewed from the top. As is shown in Fig. 1B, the crate 10 has reached the reading area 200, and the beam 12 has been produced from the source of light 13 in the colour differentiation unit 14. White light is produced from the source of light 13 and passed through optical-fibre cables $18a_1$,$18a_2$,$18a_3$ or optical fibres. The optical fibres $18a_1$,$18a_2$... have been divided into a vertical line into a beam of light, and from said fibre ends placed side by side the light is passed next to a lens 19. The lens forms a strip of light or a beam of light of uniform thickness out of the light, which beam is directed at the side face 10a of the crate 10. In this way a ray of light S_1 is produced from the source of light 13 onto the face of the crate 10, and the reflected ray of light S_2 is received by means of the detectors 17a,17b and 17c.

Fig. 1C shows the equipment as viewed in the direction of the arrow k_2 in Fig. 1A. As is shown in the figure, the pyramid-shaped reading area 200 is fitted in the solution of equipment so that the detector equipment 17a,17b,17c that receives the reflected ray of light B_2 is placed in the middle area of the height in relation to the height S_1 of the crate 10. In this way the reading precision can be made as good as possible. As is shown in Fig. 1C, the ends of the optical fibres $18a_1$,$18a_2$,$18a_3$,$18a_4$ and $18a_5$ have been fitted so that they are in the same vertical position and that the white light produced from them is passed and collected by means of a lens 19 so that, out of the light, a strip or beam of light 12 of uniform thickness is formed on the side 10a of the crate 10.

Fig. 1D is an illustration taken in the direction of the arrow k_3 in Fig. 1A, i.e. perpendicularly to the direction of transfer L_1 of the conveyor. As is shown in the

illustrative presentation, the detector equipment 17a,17b,17c is placed at the tip of the reading area, i.e. of the reading pyramid. All beams 12 reflected in the area of the pyramid in the space defined by the side faces and the bottom of the pyramid and onto said faces can be read by means of the detector device 17a,17b,17c in accordance with the invention. The beam of light 12 is fitted to be transmitted onto the face of the crate so that it will pass substantially over the length of the side wall of the crate in the vertical direction.

In the exemplifying embodiment shown in Fig. 2, there is a crate 10 on the conveyor 11. Onto the side face 10a of the crate 10, a beam of light 12 is produced from a source of light 13, which transmits a ray of light S_1 of white light onto the face of the crate. The ray of light S_1 is reflected from the side face 10a of the crate, and the reflected ray of light S_2 is transferred into the colour differentiation unit 14, in which the code of the colour is produced. The code is compared with the stored colour codes present in the memory 15a of the central unit 15, i.e. in the so-called library, and in this way, if the codes correspond to each other, the crate type is identified. The colour differentiation unit 14 comprises filters 16a,16b,16c and, after them, detectors 17a,17b,17c, which measure the proportions of red, blue and green light in the reflected light S_2. When objects in general are identified, such as packages, cans, parcels, etc., before identification the codes of the objects to be identified are programmed in the memory 15a of the central unit 15.

In the exemplifying embodiment of Fig. 2, the crate 10 is placed on the conveyor 11. At a suitable distance from the source of light 13, through an optical-fibre cable 18, i.e. the optical fibres $18a_1$,$18a_2$..., and the lens 19, a ray S_1 of white light is transmitted onto the side face 10a of the crate 10, and the reflected ray of light S_2 is passed to the colour differentiation device 14, to its colour differentiation unit 300. The colour of the crate is measured, and colour codes (R,G,B) are produced for the crate 10, which codes are compared with the pre-stored colour codes (R',G',B') of different crates in the memory 15a of the central unit 15. If the measured data correspond to the stored data, the crate type is identified, and the

feedback corresponding to the identification, i.e. the crate type, is given, for example a receipt/money or equivalent.

As is shown in Fig. 2, from the source of light a ray S_1 of white light is transmitted to the face of the crate 10. Through the optical-fibre cable, the reflected light S_2 is treated in its direction of width D so that three component samples a_1,a_2,a_3 are obtained from it. The width D of the beam of light 12 is preferably in the range 5 to 20 mm. The samples a_1,a_2,a_3 are filtered in the filters 16,16a,16b and 16c, in which the samples a_1,a_2,a_3 are filtered in respect of red (R), green (G) and blue (B) colour. The filter 16a permits the passage of red (R) light, the filter 16b blue (B) light, and the filter 16c green (G) light. After the filter 16a, there is the detector 17a, after the filter 16b the detector 17b, and after the filter 16c the detector 17c. The detectors 17a,17b,17c detect the proportion of each component of light (R,G,B) in the sample, for example, by measuring the intensities of the filtered components of light. In this way the proportion of each colour can be measured, and thereby a colour code of three values is obtained for the measured light. The colour code that is obtained is compared with the codes of known colours stored in the memory 15a of the central unit 15, and as a result of the comparison the type of the crate 10 can be defined on the basis of its colours. In this way the crate 10 can be identified and sorted.

Figs. 3A,3B,3C illustrate transfer of the crate through the reading area 200 (so-called reading pyramid). In Fig. 3A, identification of the crate has been started, beginning from the vertical edge of the crate. From the beginning of the crate, from the area A"'...A"", it is possible to identify the general colour of the crate.

In Fig. 3B, the strip of light or beam of light 12 is already in the middle area of the crate, in which area, as a rule, the logo provided on the crate is placed, and in Fig. 3C, in the longitudinal direction of the crate, the end area of the crate has been reached, where the reading can be discontinued, for example, before the final edge of the crate 10.

Fig. 4A shows the reading stage corresponding to Fig. 3A, in which the beam 12 is placed at the inlet edge of the crate.

Fig. 4B shows the location of the beam 12, corresponding to Fig. 3B, on the coloured logo (LO) provided on the face of the crate, and Fig. 4C shows the location of the beam 12 in the final area of the side wall 10a of the crate 10, where the reading can be stopped.

In the solution of equipment in accordance with the invention, a reading area shaped as a pyramid or as a truncated pyramid and an oblong strip of light or beam of light 12 are employed, which beam of light has been produced out of a source of light 13 that transmits white light through optical-fibre cables, i.e. optical fibres $18a_1$, $18a_2$, $18a_3$... onto the side face 10a of the crate 10. It is an advantage of the solution that it is not so significant what the location of the crate 10 is in relation to the belt run 11a of the conveyor 11. It is most important that the longitudinal axis X_1 of the crate is parallel to the longitudinal axis X_2 of the conveyor 11, in which case what is called angular errors are avoided, which would deteriorate the reading accuracy.

The equipment 14 reads the colour of the side face 10a of the crate 10 from the reading point A_1 to the reading point A_2. The reading is carried out by reading the colours of the beam of light at certain time intervals with frequent sampling, for example at distances of two millimetres, from end to end over the reading area $A_1 \ldots A_2$ on the crate. In this way a substantial proportion of the side face of the crate can be read, and a colour code combination R,G,B of the average colour corresponding to each position of length of the crate that is read can be produced. Said code (R,G,B) can be produced as a voltage value, and further as a numerical number.

The identification of the logo (LO) provided on the crate 10, for example in the position shown in Figs. 3B—4B, can be carried out so that the colours R,G,B are detected over a certain area of length of the side wall 10a of the crate, for example in the area A`...A". This area A`...A" is pre-selected in compliance with the

location of the logo LO so that the test area, i.e. the sample, represents the most typical location of occurrence of the logo. Finally, the average value of the colour values of the beams of colour measured from the area A'...A" is computed, which average value represents the identification code of the logo (LO) of the crate type concerned. The process of measurement is similar, for example, in respect of the general colour of the crate (area A"'...A"") and in respect of specific colours or features of the crate.

Thus, when the crate types to be identified are transferred to the memory 15a of the central unit 15, i.e. to the so-called library, the programming of said identification data is carried out so that the characteristic features related to each crate are fed from certain areas and, thus, when crates to be identified are tested, the identification data $R_1,G_1,B_1;R_2,G_2,B_2;R_3,G_3,B_3$ obtained/measured are compared by means of an algorithm with the identification data stored in the memory 15a, and if the colour codes of the average colour of certain areas and/or of the total area of the crate 10 to be identified can be made to correspond to some colour code combination of a certain crate type stored in the memory of the central unit with a certain tolerance, said identification is accepted, and the identification of the crate is recorded to have been effected.

When a crate type is being identified, preferably three different tests are carried out. From the crate to be measured, by means of an algorithm, a) the basic colour of the crate is identified. This can be detected, for example, by detecting the forward area of the vertical side of the crate. A second test is carried out at the logo (LO), i.e. a certain area of the crate to be identified is tested, and the data are compared with the values of corresponding areas stored in the so-called crate library in the memory of the machine. c) As a test it is possible to test a colour matrix over a certain distance area at a certain detail, label, letter, series of numerals, and to compare said result with the group of values of the corresponding area stored in the library, i.e. in the memory 15a. If a crate that complies with the three tests is found in the memory 15a, i.e. in the library, said crate type is identified as said type stored in the memory of the library, and this is reported to the person returning the crate, and/or further

treatment of the crate is carried out based on the identification. If the crate is not identified, the transfer direction of the conveyor belt can be reversed in order to return the crate to the starting point. Based on the crate identification, the person returning the crate can be given a receipt or the money or equivalent corresponding to the return price of the crate.

In the solution of equipment and in the method in accordance with the invention, the crate is fed through the colour identification point at an invariable speed by moving the belt run 11a of the conveyor 11 at an invariable speed. The identification of the crate is carried out while the belt and, thus, the crate placed on the belt are moved continuously. Thus, in the measurement stage, when the colour matrix is determined, the crate is not stopped separately, but the measurement stage is continuous, and the movement of the crate during the measurement process is uniform.

Fig. 5 illustrates the signal data concerning a measured crate type colour by colour. The broken line f_1 illustrates the measured signal intensity of red colour over the distance of the crate wall. The broken line f_2 illustrates the measured signal intensity of green colour, and the broken line f_3 illustrates the measured signal intensity of blue colour over the length of the side wall of the crate.

Fig. 6A illustrates a detector equipment in accordance with the invention, in which, as is illustrated in the figure, the beam of light 12 and the light reflected from it are examined by means of the identification unit 300 of the colour identification device 14, which unit consists of a single integrated component that comprises filters 16a,16b,16c placed side by side and detectors 17a,17b,17c placed in direct connection with them. The identification unit 300 is a single integrated component.

In Fig. 6A, the measurement device 500 is illustrated ahead of the colour identification device 14, as viewed in the direction of transfer of the crate. By means of the measurement device 500, the distance of the crate from the identification unit 300 is measured. Thus, expressly the distance of the beam of light 12 on the face of the

crate from the identification unit 300 is measured. Each machine is subjected to separate calibration to establish conversion curves specifically for each machine.

In the method in accordance with the invention, the voltage values coming from the different detectors 17a,17b and 17c in the unit 300 are, so to say, normalized as percentages of reflection in a scale ranging from 0 to 100.

Fig. 6B shows the colour differentiation unit 300 of the colour differentiation device 14, which unit comprises filters 16a,16b,16c placed side by side and, after each of the filters, a detector 17a,17b and 17c related to each of the filters, from each of which detectors the voltage that indicates each colour can be passed directly to further processing, in which the voltage can be converted to a numerical reading value. The filters 16a,16b,16c have been integrated with the related detectors 17a,17b and 17c into a single chip.

Fig. 6C illustrates the formation of a colour matrix out of the colour values on the side face 10a of the crate 10. The device 500 that measures the distance of the colour identification unit 300 from the side face 10a of the crate 10 is placed before the unit 300, viewed in the direction of transfer of the crate. The measurement device can operate by means of any principle whatsoever. It can be an ultrasonic measurement device, an electrical measurement device, a light-transmitting/receiving device, etc.

As is shown in Fig. 6D, the conversion takes place as follows. The voltages coming out from the detectors 17a,17b and 17c in the unit 300 are read. In the following, for example, red light, i.e. the voltage coming from the detector 17a, is examined. The voltage value is read from the horizontal system of coordinates X in Fig. 6D, and when the distance of the crate from the colour identification unit 300, measured by means of the device 500, is known, from the set of graphs in Fig. 6D the graph corresponding to the distance that is read and related to the colour R or G or B is chosen, for the distance 1 the graphs f_R', f_G', f_B'; for the distance 2 the graphs f_R, f_G,

f_B, through which, in the way illustrated in the figure, a so-called normalized scaling value is reached in the vertical system of coordinates Y.

Thus, the voltage that comes from a detector 17a or 17b or 17c, which detector always indicates a certain colour, corresponds to a graph corresponding to a certain measured distance and to a normalized value read through said graph. The figure illustrates the conversion of the voltage y' through the graph f_G' related to green colour (G) and to the distance 1 into the code value X'.

When the crates 10 are read into the memory 15a of the device, in the reading stage, measurement of the distance of the crate by means of the measurement device 500 is carried out and the colour values coming from the detector are converted in said reading stage, by means of the conversion graphs $f_R', f_G', f_B'; f_R, f_G, f_B$ tuned for the machine concerned, into normalized colour code values, which have been scaled in a scale ranging from 0 to 100.

Similarly, when the colour of the side face of a returned crate or of a crate to be treated otherwise is read and when the colour matrix of the colour of the side face 10a of the crate is produced, which matrix is understood as the R,G,B values at different points of length of the side of the crate, i.e. over the length of the side face of the crate, said values are converted, directly upon formation of the colour matrix, by means of the conversion described herein, into normalized values.

The conversion curves can be computed for the machine at certain regular distances which occur in the transfer of the crate, and the intermediate distances and values are obtained mathematically, for example, by means of interpolation.

Thus, irrespective of the distance of the crate, based on the conversion described herein and on the measurement of the distance of the crate, the colour values of the returned crate can be compared with the colour values stored in the crate memory.

The identifier 14 in accordance with the invention is excellently suitable for use in connection with automatic return-crate machines in their crate tunnel protected from light. Thus, the device in accordance with the invention can be used so that the automatic return-crate machine counts the returned bottles contained in the crate and the identifier device in accordance with the invention detects the crate type. It is obvious that the device can also be used separately for sorting and differentiation of the crates alone.

Fig. 7 shows the identifier in accordance with the invention and its colour differentiation equipment 14 in connection with an automatic return-crate machine 600. The identifier 14 is fitted in the crate tunnel T in the equipment 600, and by means of the equipment P, by whose means the returned bottles contained in the crate 10 and the number of said bottles are identified, the distance of the crate from the identifier 14 placed at the side of the conveyor is also measured.

Claims

1. An identifier, **characterized** in that the identifier comprises a source of light (13), from which a strip of light of uniform thickness is produced onto the face of the object to be identified, and that said strip of light or beam of light (12) produced onto the face of the object is monitored by means of a colour differentiation device (17), which receives the ray of light (B_2) reflected from the face of the object, and that, by means of signals produced by means of the colour differentiation device (17), colour codes are produced out of different face areas of the monitored object, which codes are compared with colour codes of objects to be identified stored in the memory (15a) of the central unit (15) of the device, in which connection the object is identified on the basis of the comparison.

2. An identifier as claimed in claim 1, **characterized** in that the object (10) to be identified is a crate.

3. An identifier as claimed in claim 1 or 2, **characterized** in that the equipment comprises a conveyor (11), on which the object (10) to be identified is transferred past the colour identification point.

4. An identifier as claimed in claim 1 or 2, **characterized** in that the strip of light or beam of light (12) is produced from a source of light (13), preferably from a source of light that produces white light through optical fibres ($18a_1, 18a_2, 18a_3 \ldots$).

5. An equipment as claimed in the preceding claim, **characterized** in that the ends of the optical fibres ($18a_1, 18a_2 \ldots$) have been fitted in a beam of light (G) so that the ends of the optical fibres are placed side by side and that the ray of light departing from them forms a strip of light, which is formed through a lens (19) into a beam of light (12) of uniform thickness on the side face (10a) of the object (10).

6. An identifier of a crate as claimed in any of the preceding claims, **characterized** in that the strip of light or beam of light (12) runs in the vertical direction on the

face of the object (10), and that said beam of light (12) has an invariable width (D_1), which is in the range 5...20 mm.

7. An identifier of a crate as claimed in any of the preceding claims, **characterized** in that the colour differentiation unit (14) that receives light comprises filters (16a,16b and 16c) and, after them, detectors (17a,17b,17c), the filters (16a,16b,16c) being placed side by side and being fitted to take a sample (a_1,a_2,a_3) from each beam of light during a cycle of measurement, which sample is transferred through the filter (16a,16b,16c) into the detector (17a,17b,17c) related to each filter, in which connection one of the filters (16a) is fitted to admit the passage of red light to the related detector (17a), which detector produces a voltage value corresponding to said signal and further a numerical value, and that the filter (16b) that admits the passage of green light is connected with the detector (17b), which measures the intensity of said component of light and converts it into a voltage, and that the filter (16c) that admits the passage of blue light is connected with the detector (17c) that detects said component of light and that converts the proportion of said component of light in the sample into a voltage value, which can be converted further into a numerical value, and that in this way, from each location along the side of the crate, a code (R,G,B) of the average colour corresponding to said point on the side of the crate is formed.

8. An identifier of a crate as claimed in any of the preceding claims, **characterized** in that the filters (16a,16b,16c) in the colour differentiation unit (14) and the related detectors (17a,17b,17c) have been fitted side by side (as viewed in the direction of transfer of the object to be identified) and as a single integrated unit.

9. An identifier of a crate as claimed in any of the preceding claims, **characterized** in that the identifier unit (16a,16b,16c,17a,17b,17c) of the colour differentiation unit (14) is fitted to receive/read the strip of light produced onto the face of the object (10) to be identified from a reading area, which has the shape of a pyramid and at whose tip the identifier unit (300;16a,16b,16c,17a,17b,17c) of the colour differentiation unit (14) is placed.

10. An identifier of a crate as claimed in any of the preceding claims, **characterized** in that the equipment comprises a central unit (15) and in it a memory (15a), i.e. a so-called library, into which the different colour codes (R',G',B') of the areas of identification of types of objects to be identified have been stored in advance, which areas of identification comprise the area of location of a logo (LO) provided on the face of the object, on the side face (area A'...A") of the object (10) and preferably also an area that indicates the basic colour of the object on the side face of the object, and further preferably a third area on the side face of the object, which area includes some specific feature on the side face of said object to be identified, such as a letter, a label or equivalent.

11. An identifier of a crate as claimed in any of the preceding claims, **characterized** in that, before the colour differentiation unit (14) and before the point at which the beam of light (12) meets the side face of the crate, the equipment comprises a distance measurement device (500), by whose means the distance of the side face of the object to be identified from the identifier unit (300) of the colour differentiation unit (14) is measured.

12. A method for identification of an object, **characterized** in that, in the method, the average colour of the side face of the object to be identified is detected at different points of length on the side (10a) of the object in a certain area (A'...A") over the length of the object, and that the code of the average colour of said area (A'...A") is computed out of the colour codes taken from said area, and the code of the average colour thus obtained is compared, by means of an algorithm or equivalent, with the codes of a corresponding area on the object to be identified stored in the memory (15a) of the central unit (15) of the device, into which memory the data concerning the colour codes of the different types of objects to be identified have been stored in advance.

13. A method as claimed in claim 12, **characterized** in that, in the method, one reading area (A'...A") on the face of the object to be identified corresponds to the area of location of the logo (LO) on the face of the object (10) to be identified.

14. A method as claimed in claim 12, **characterized** in that one reading area on the face of the object (10) has been chosen so that it corresponds to the average basic colour of the side face of the object (10) from which the colour is read.

15. A method as claimed in claims 12 to 14 in identification of an object (10), **characterized** in that, in the method, the voltages that indicate different colours, produced from the detectors (17a,17b,17c), are converted by means of conversion graphs (f_R',f_G',f_B';f_R,f_G,f_B...) into so-called normalized colour code values, conversion graphs having been determined for each machine separately, and that conversion graphs (f_R',f_G',f_B';f_R,f_G,f_B) exist/have been created for each colour (R,G,B) and for each distance of the crate (10) from the identifier unit (300), in which connection, by means of the distance of the crate measured in the identification process, a normalized colour code is produced both when colour code values are stored in the memory (15a) of the machine and when a crate (10) to be identified is read.

16. A method as claimed in claim 12, **characterized** in that one reading area on the face of the object has been taken from the distance of length of the side face of the object, in which area a certain specific sign, such as a letter, numeral, pattern, or equivalent occurs.

17. A method as claimed in any of the preceding claims 12 to 15, **characterized** in that the object to be identified is a crate (10).

18. A method as claimed in claim 16, **characterized** in that, in the method, the crate (10) to be identified is moved, and that the crate is placed onto the conveyor so that its longitudinal axis (X_1) is substantially parallel to the longitudinal axis (X_2) of the conveyor (11), and that from a source of light (13) a strip of light or beam of light (12) of uniform thickness is produced onto the face (10a) of the crate (10) to be identified, and that the beam of light (12) is fitted to run vertically on the side face of the crate, and that said beam of light (12) is monitored by means of a colour differentiation unit (14).

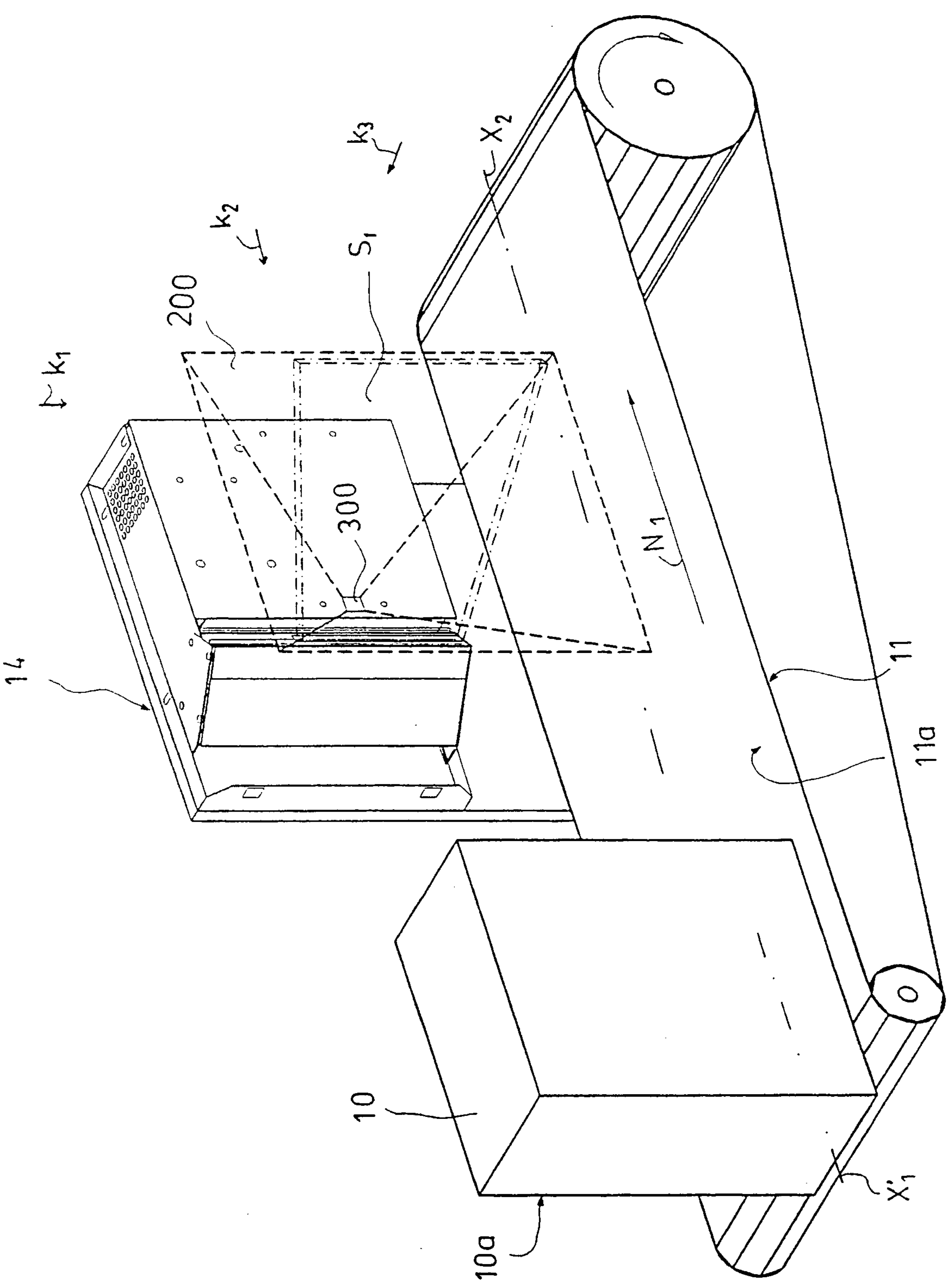


FIG 1A

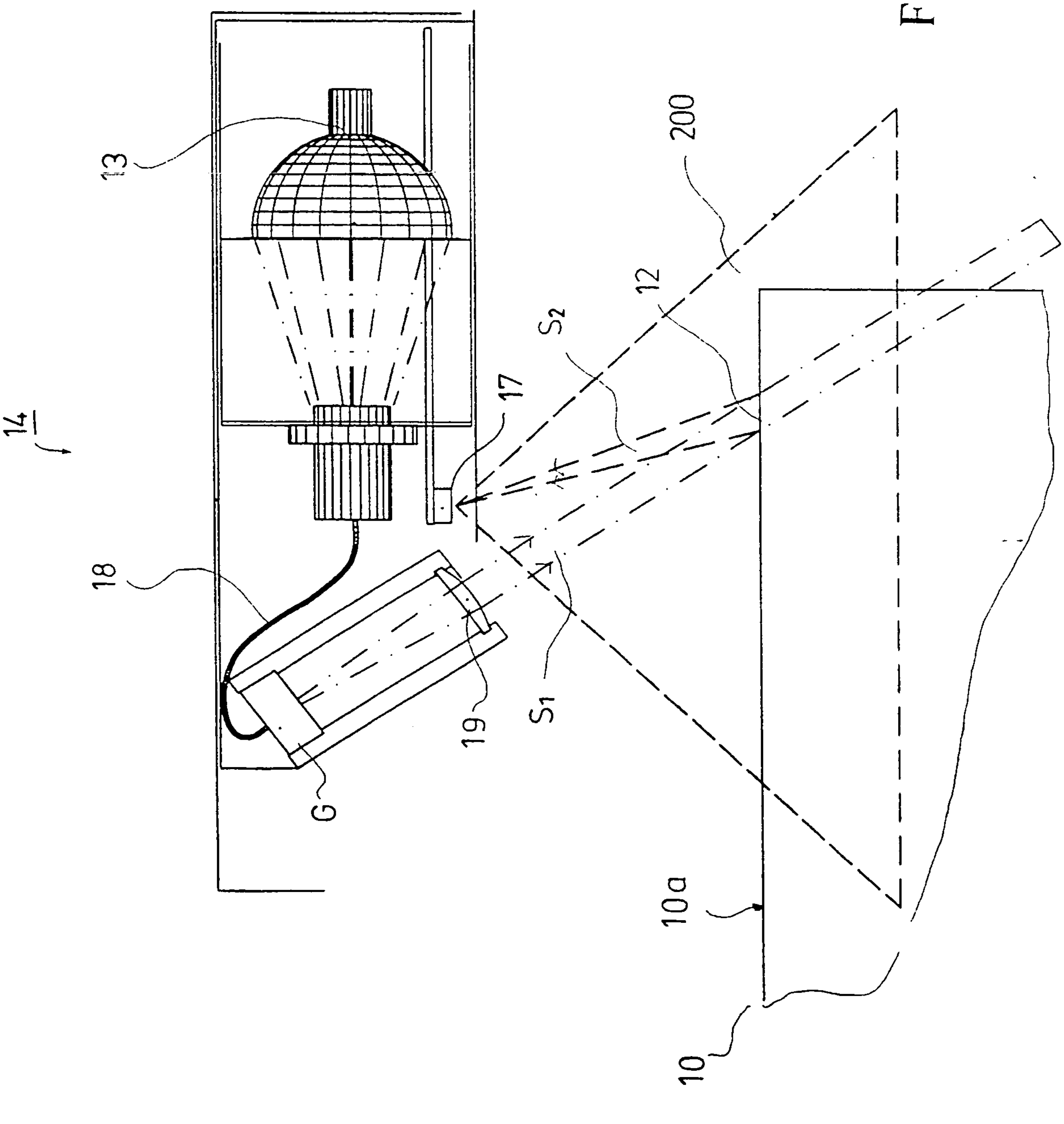


FIG 1B

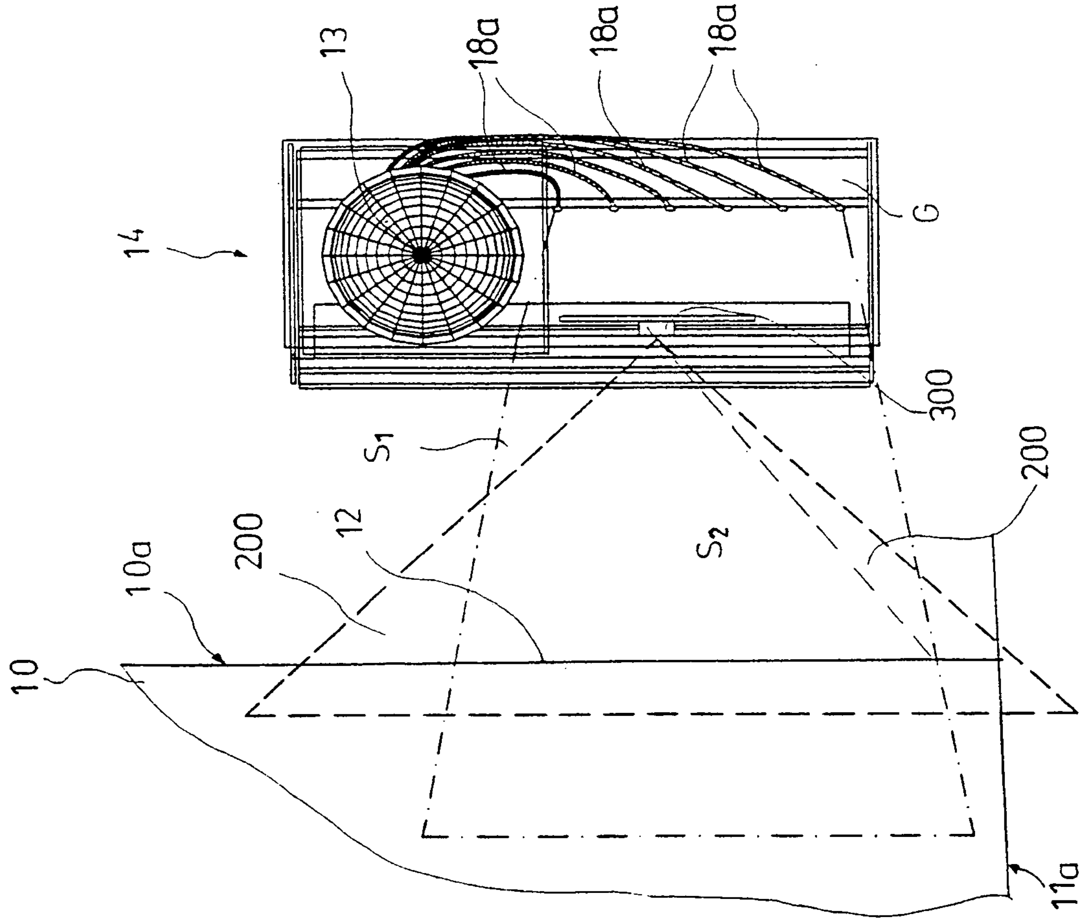


FIG 1C

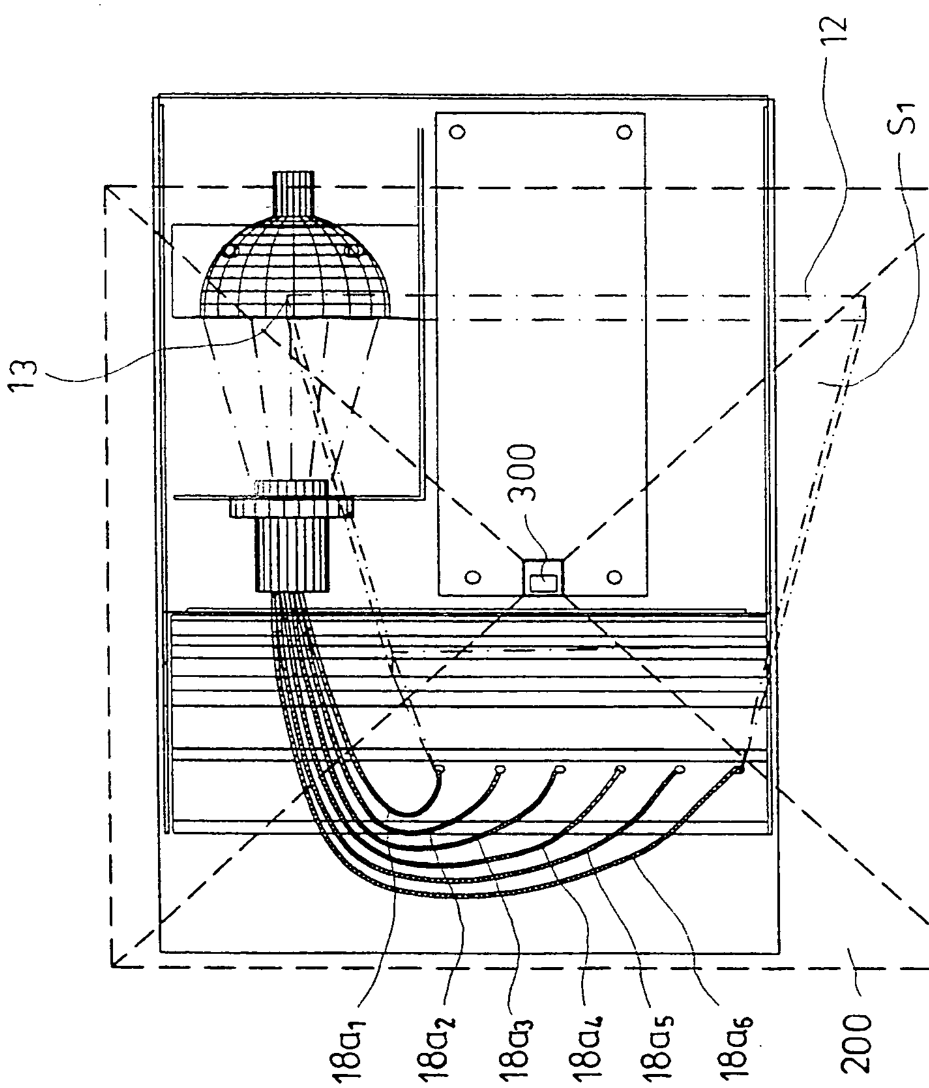


FIG 1D

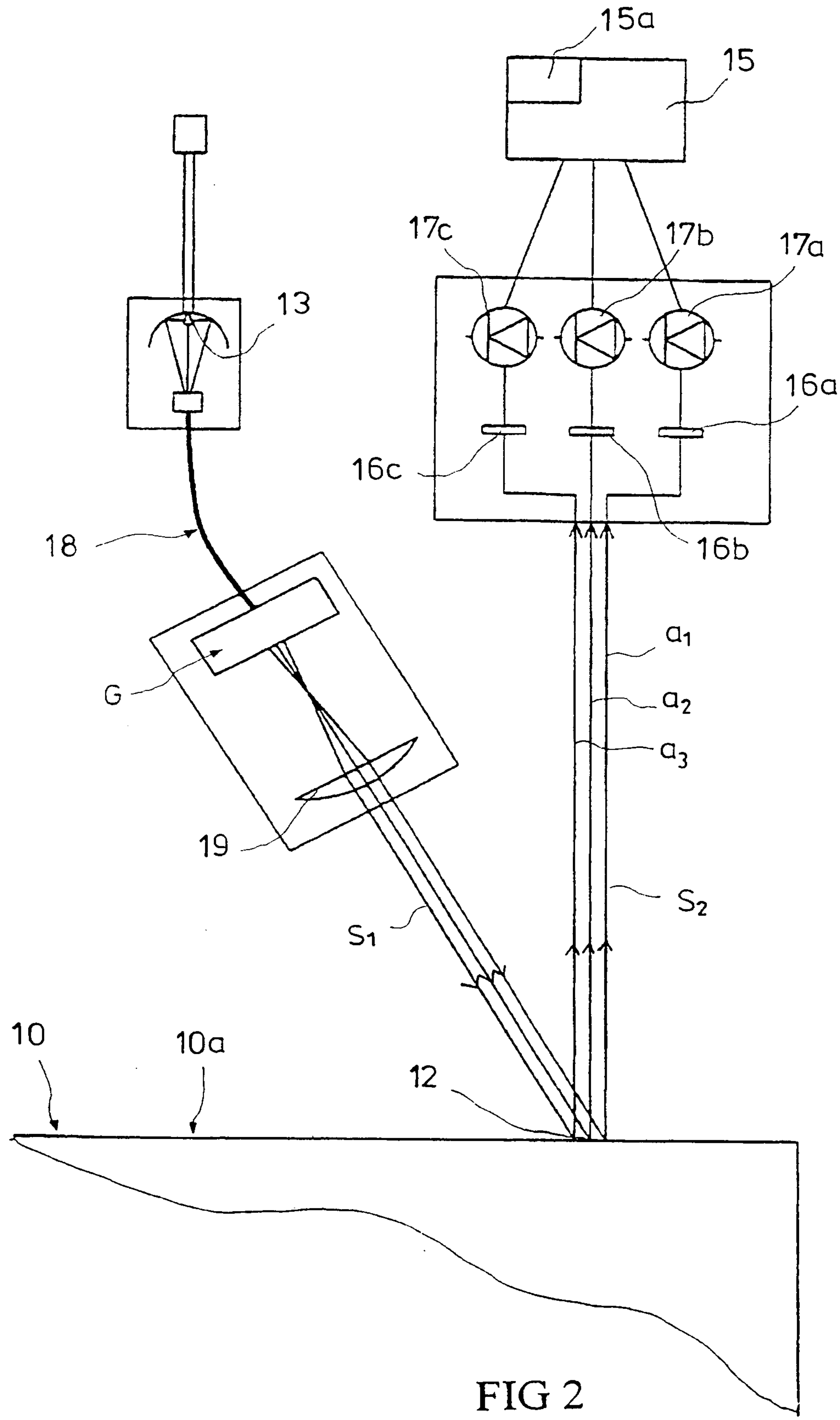


FIG 2

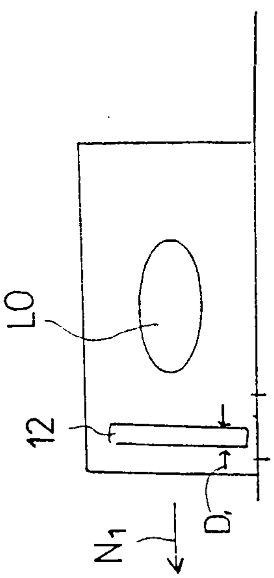


FIG 4A

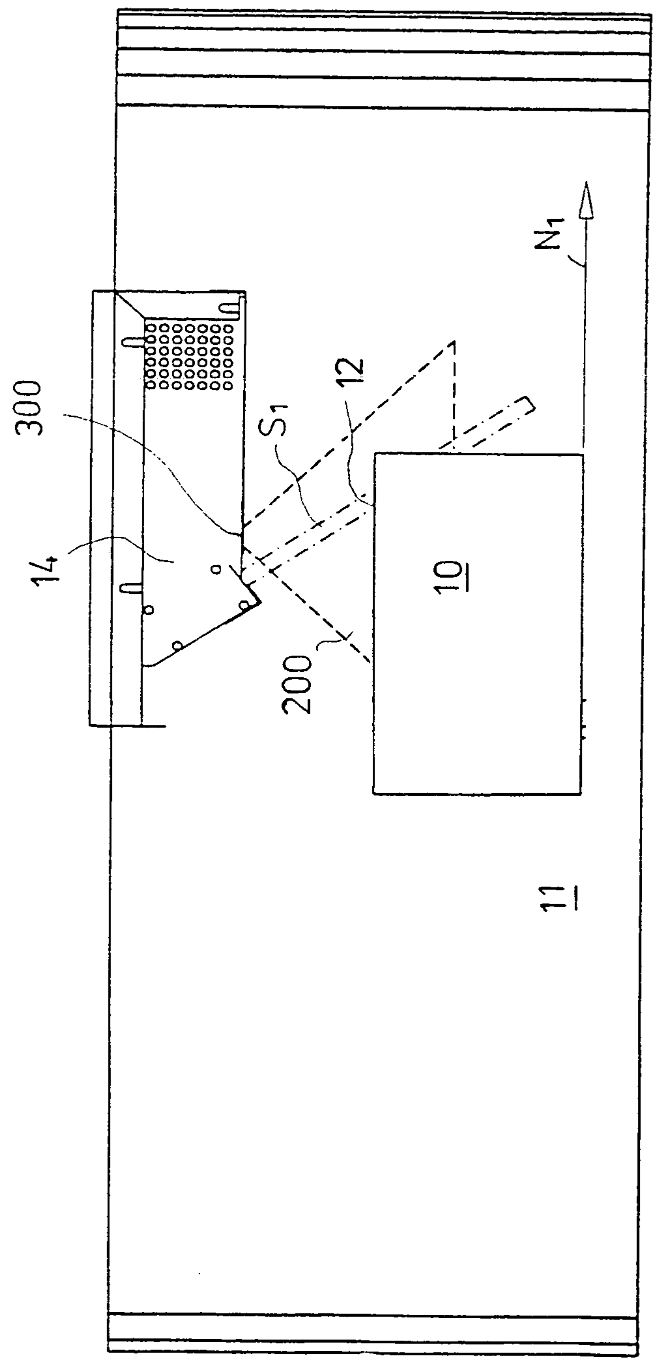


FIG 3A

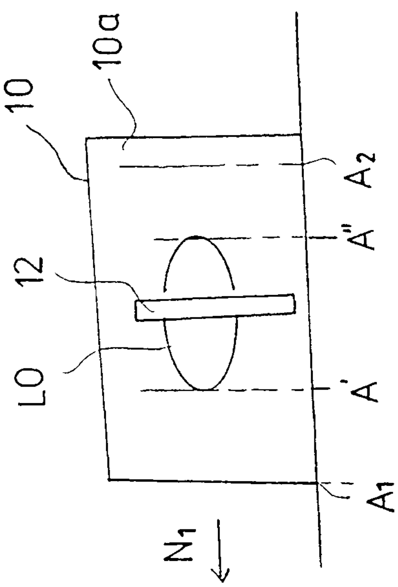


FIG 4B

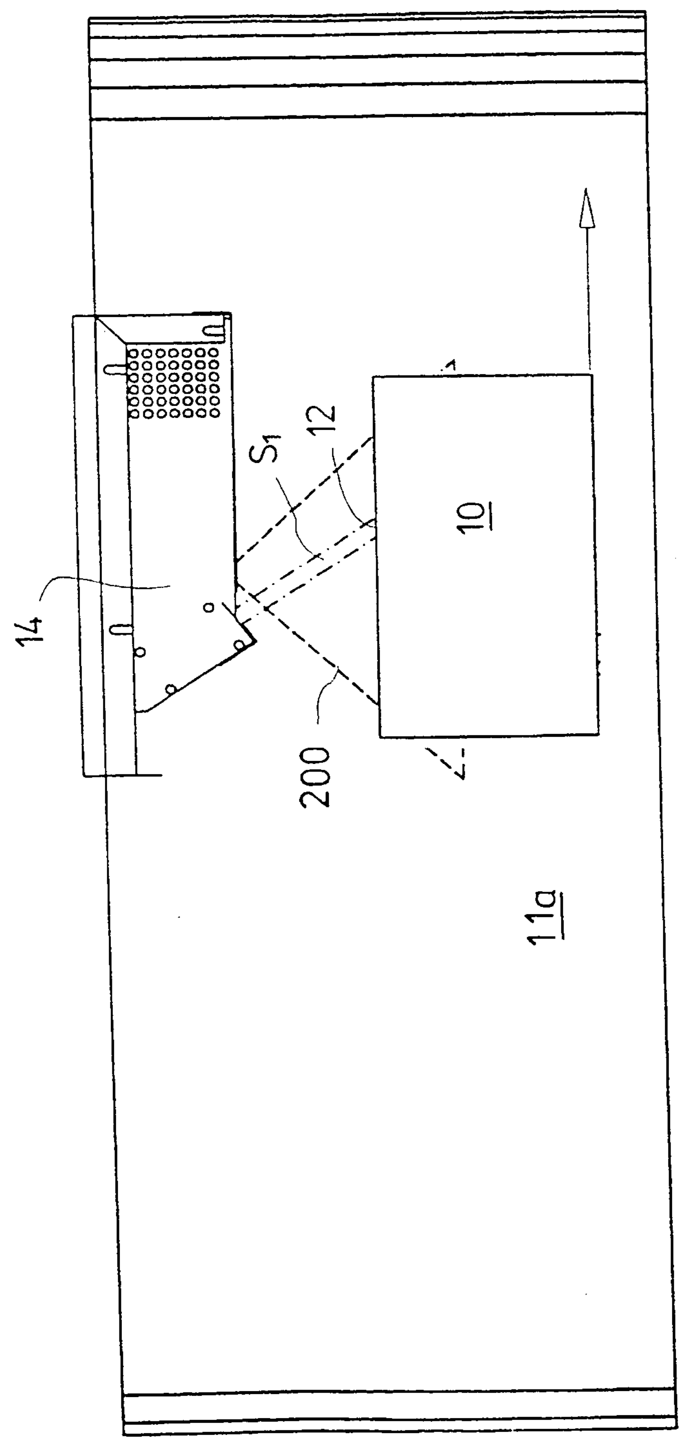


FIG 3B

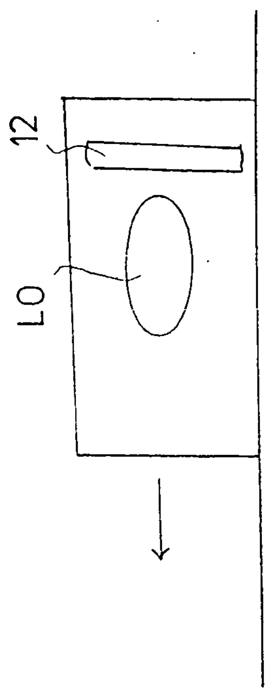


FIG 4C

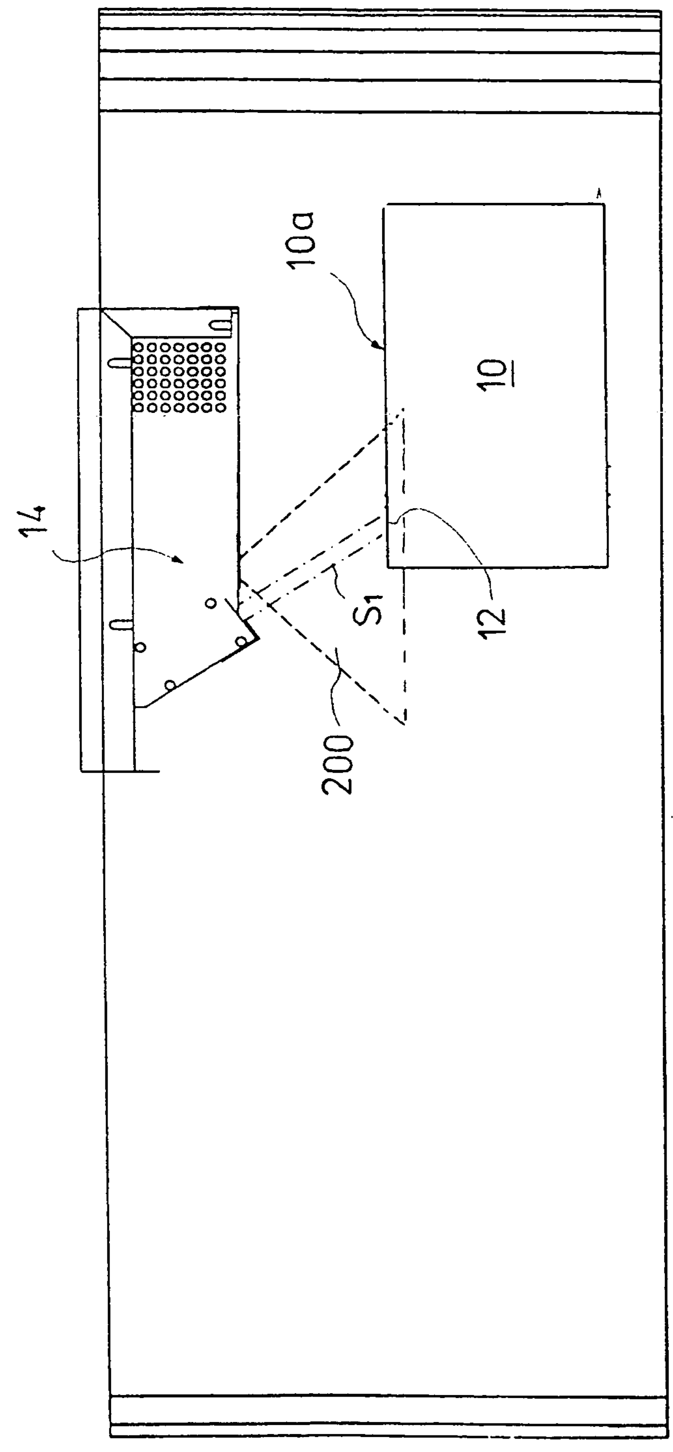
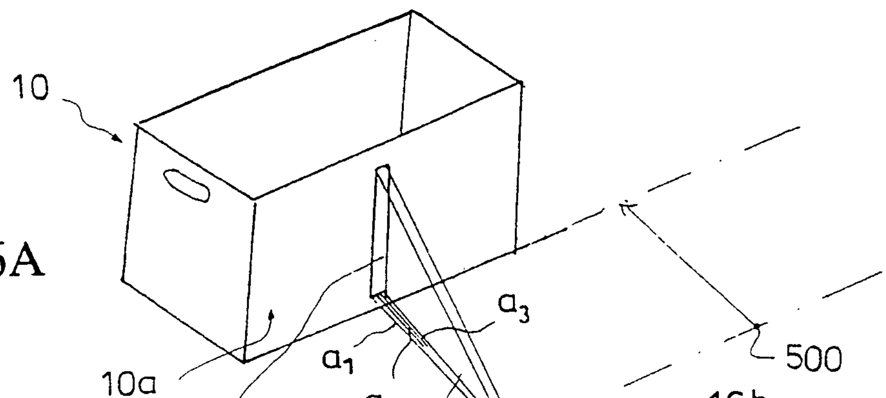


FIG 3C

FIG 6A



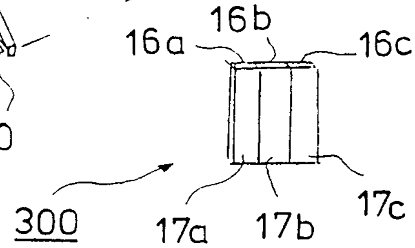
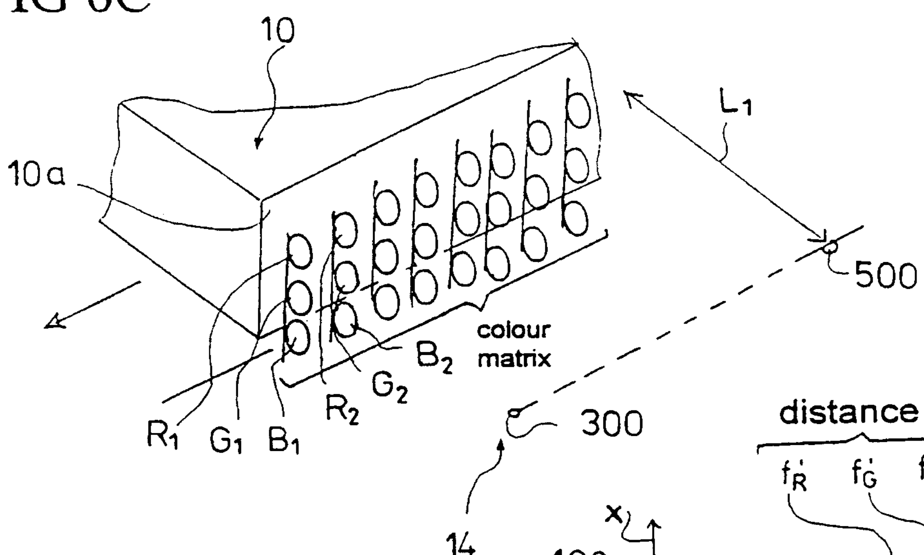


FIG 6B

FIG 6C



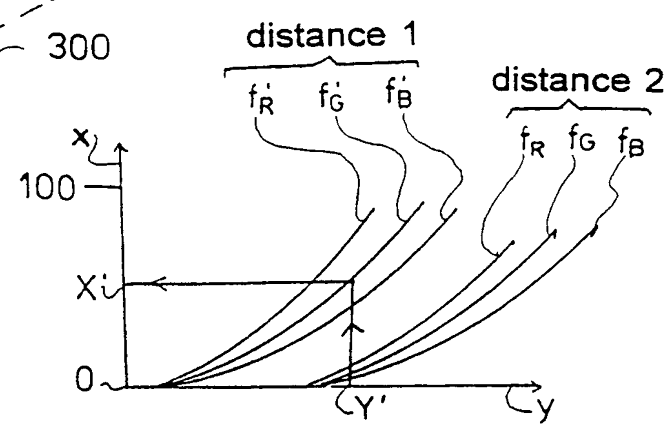


FIG 6D

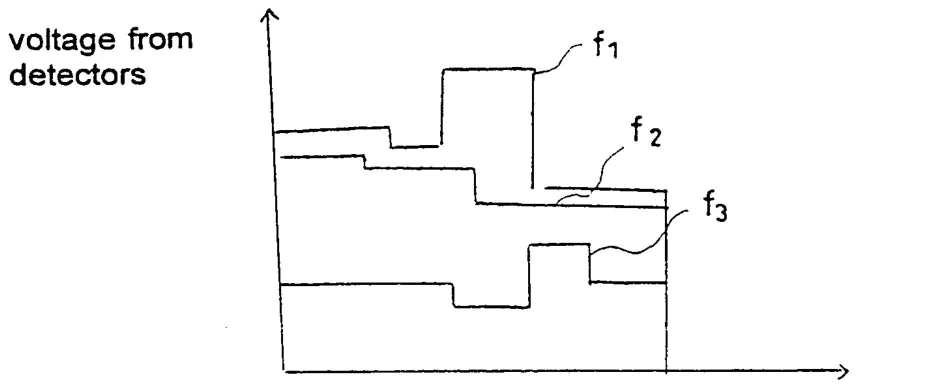

voltage from detectors
f_1
f_2
f_3
distance of length of crate

FIG 5

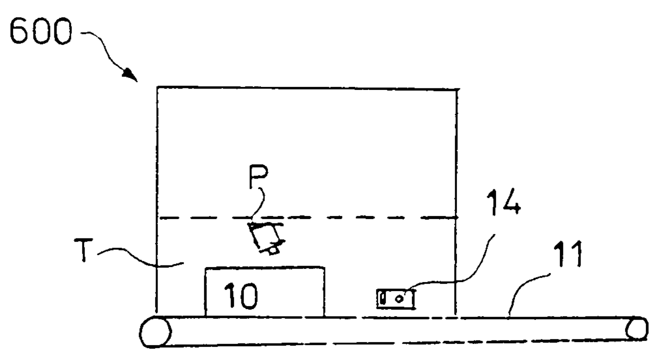

600
P
14
T
11
10

FIG 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 97/00717

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B07C 5/34
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 3804499 A1 (FRANZ DELBROUCK GMBH), 24 August 1989 (24.08.89) --	1-18
A	US 4175236 A (J.W. JUVINALL), 20 November 1979 (20.11.79) --	1-18
A	US 4244650 A (J.H. GARFUNKEL ET AL), 13 January 1981 (13.01.81) -- --------	1-18

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 February 1998	24 -02- 1998

Name and mailing address of the ISA/	Authorized officer
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Åke Olofsson Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

03/02/98

International application No.
PCT/FI 97/00717

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		NL 8104922 A	01/03/82
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